The Problem

Since the early 1900s, wildlife conservation efforts in the United States have focused on restoring, protecting, and managing populations of many wildlife species. In some cases, such as the white-tailed deer and Canada goose, these efforts have been so successful that these species have become locally overabundant. These and other overabundant species can cause a variety of conflicts with humans, ranging from minor nuisance issues to serious habitat and crop destruction, disease spread, and vehicle and aircraft collisions.

Hunting and trapping have been the traditional methods fish and wildlife agencies use to manage wildlife populations. However in urban and suburban areas, where most human-wildlife conflicts occur, these management practices are often legally restricted, impractical, or socially undesirable. Wildlife contraception is one method—when used as part of an integrated approach with other methods—that can potentially help manage locally overabundant wildlife populations in these particular settings.

Science-Based Solutions

Scientists at the National Wildlife Research Center (NWRC), part of the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS), are developing several wildlife contraceptives for use with overabundant mammal and bird species.

NWRC—the research arm of APHIS' Wildlife Services program—works collaboratively with State fish and wildlife agencies, universities, zoos, international organizations, and private partners to develop, test, and register wildlife contraceptives for use in wildlife damage management. Some of the products investigated have been employed previously in human medicine or in farm animal production. Others have been dispensed as vaccines or as oral baits. Regardless of origin, contraceptives are a promising new wildlife management tool.

Contraceptives alone, however, cannot rapidly reduce overabundant wildlife populations to healthy levels. Instead, they may be most useful in specific and limited situations in conjunction with other wildlife management methods, such as hunting. Immediate population goals can be met only by removing problem animals. Contraceptives can then be used to slow the rate of population recovery in these managed areas.

NWRC scientists strive to develop wildlife contraceptives that are:

- Safe for the target species, nontarget species, and the environment
- Free of undesirable side effects
- Safe for human consumption if ingested while eating animal products

GonaCon™-Immunocontraceptive Vaccine

Method of Application:
Single-shot, hand-injected vaccine

Target Species:
Adult female white-tailed deer (*Odocoileus virginianus*)

GonaCon has been tested successfully in other mammal species, including elk, fallow deer, horses, bison, feral swine, prairie dogs, ground squirrels, and feral dogs and cats. Future registration of GonaCon for use in other species is expected.

How It Works:
GonaCon stimulates the production of antibodies that bind to GnRH—a gonadotropin-releasing hormone necessary for production of estrogen, progesterone, and testosterone. By binding to GnRH, the antibodies reduce GnRH's ability to stimulate the release of these sex hormones. As long as a sufficient level of antibody activity is present in the bloodstream, sexual activity is decreased, and vaccinated animals remain infertile.

Effectiveness:
A single, hand-injected dose of GonaCon has successfully kept some female deer infertile for up to 5 years in pen studies. During field studies in New Jersey and Maryland with free-ranging deer in semi-enclosed urban settings, the vaccine was 67 to 88 percent effective at preventing pregnancy the first year and 47 to 48 percent effective the second year. A second dose can be administered during year 2 to extend contraceptive effectiveness. Additional research

GonaCon is an injectable vaccine for use with mammals, such as white-tailed deer, prairie dogs, and feral dogs and cats.

is needed to determine how often deer will need to be re-vaccinated to maintain infertility in subsequent years.

Status of Registration:
Registered by the U.S. Environmental Protection Agency (EPA).

Who Can Use:
GonaCon is regulated by EPA and is a restricted-use chemical. Only USDA Wildlife Services or State wildlife management agency personnel or individuals working under their authority can use it. GonaCon users must also follow State authorization processes. All requirements on the product label must be strictly followed.

OvoControl® G and P—Oral Bait

Method of Application:
Oral, bread-like bait fed to target animals prior to and during their breeding season; it can be distributed with broadcast bait feeders or by hand.

Target Species:
Resident Canada geese (*Branta canadensis*), Muscovy ducks (*Anas moschata*), and feral pigeons (*Columba livia*)

How It Works:
OvoControl contains 0.5 percent nicarbazin—the active ingredient traditionally given to broiler chickens to prevent the disease coccidiosis. A side effect of nicarbazin is decreased egg hatchability and egg production. Nicarbazin affects the hatchability of eggs by changing the pH of the yolk and weakening the yolk membrane, which allows the albumin and yolk to mix. It also inhibits sperm from fertilizing the egg. When OvoControl is fed to Canada geese or pigeons for the duration of their breeding season, it effectively reduces the hatchability of eggs. The effects are fully reversible, and when OvoControl is withdrawn, egg production and hatchability return to normal within a few weeks.

Effectiveness:
OvoControl has no effect on the current number of adult or juvenile resident geese or pigeons. Under ideal conditions, with all target birds consuming the appropriate dose during the breeding season, no new chicks are hatched. Under actual field use, not all targeted birds may consume the bait. Consequently, some chicks may still be observed, although the numbers would be significantly reduced. Field studies in pigeons have shown a 50- to 55- percent reduction in flock population within 1 year.

Status of Registration:
Registered by EPA.

OvoControl is a registered trademark of Innolytics, LLS, Rancho Santa Fe, California. NWRC scientists collaborated with Innolytics, LLC, for 8 years to develop the OvoControl products. In 2005, the EPA granted regulatory approval for the use of OvoControl to reduce overabundant resident Canada geese populations. A registration for feral pigeons and Muscovy ducks soon followed.

Who Can Use:
OvoControl is regulated by the EPA and is a restricted-use chemical. Only licensed wildlife specialists, USDA Wildlife Services, or pest management professionals are permitted to buy and use it. All requirements on the product label must be strictly followed.

DiazaCon–Oral Bait

Method of Application:
Oral bait fed to target animals prior to their breeding season.

Target Species: Variety of birds and mammals with limited breeding seasons; current research involves monk parakeets, prairie dogs, and grey squirrels.

Overabundant feral pigeons and other wildlife can cause serious damage to natural habitats, agricultural crops, and urban landscapes.

The active ingredient (nicarbazin) in OvoControl® weakens the yolk membrane causing the yolk and albumin to mix.

How It Works:
DiazaCon (20,25 diazacholesterol) is a drug originally developed to lower cholesterol in humans. It mimics cholesterol in the body, thus inhibiting the production of cholesterol and the formation of sex hormones necessary for reproduction.

Effectiveness:
DiazaCon reduced nest productivity (nestlings plus eggs with embryos) of monk parakeets by approximately 70 percent. In preliminary studies in prairie dogs, DiazaCon reduced the number of prairie dog offspring born by approximately 98 percent.

Status of Registration:
Not registered. Field studies in support of EPA registration are ongoing.

Who Can Use:
DiazaCon will likely be registered as a "Restricted Use" agent and only be administered by licensed pest control operators, USDA Wildlife Services, or State wildlife management agency personnel or individuals working under their authority.

Safety of Contraceptives

The NWRC must adhere to Federal human health and environmental standards by registering chemicals, drugs, and vaccines with Federal and State regulatory agencies. The wildlife contraceptives NWRC develops are tested extensively and must meet or exceed the EPA's rigorous safety standards. There are no known dangers associated with human or wildlife consumption of animals that have been treated with GonaCon or OvoControl. Secondary hazard studies are ongoing for DiazaCon.

Future Research

Future NWRC research on wildlife contraception will likely involve studies to support expanded registration of existing products, develop oral delivery systems, and prevent transmission of wildlife diseases. Potential research areas include the following:

- Development of new formulations and delivery methods, including automated vaccine delivery systems for administering the injectable form of the GonaCon vaccine, as well as oral and nasal delivery systems.
- Prevention of the spread of brucellosis in bison. Brucellosis is a bacterial disease that causes infertility, abortions, and lowered milk production in cattle and bison. The disease is transmitted through contact with bodily fluids, such as milk and after-birth tissues, of infected animals. GonaCon could potentially break the cycle of this disease and reduce transmission by preventing reproduction in infected animals.
- Combined rabies and GonaCon vaccine for reducing stray dog populations and rabies in developing countries.

When OvoControl® is withdrawn from the diet, hatching success and egg production return to normal within a few weeks.

About Wildlife Services' National Wildlife Research Center

NWRC is the only Federal research facility in the United States devoted entirely to the development of methods for effective wildlife damage management. The Center applies scientific expertise to address human-wildlife conflicts involving a complex range of issues—agriculture, human health and safety, property damage, invasive species, and threatened and endangered species. NWRC scientists strive to find solutions that are biologically sound, environmentally safe, and socially responsible for use in resolving wildlife damage management problems throughout the United States and abroad. Often, the Wildlife Services' operational personnel assist NWRC scientists in developing and evaluating new management tools and methods.

NWRC employs more than 160 scientists and support staff at its headquarters in Fort Collins, CO, and at field stations throughout the United States. NWRC's scientists have expertise in a wide range of disciplines, including animal behavior, wildlife biology, wildlife sensory biology, chemistry, reproductive physiology, immunology, epidemiology, statistics, population modeling, genetics, toxicology, and veterinary medicine.

"Solutions to problems depend upon knowledge, which only research can provide."

—Edwin R. Kalmbach, first Director for the predecessor of the NWRC (1940–54)

More Information

For more information on the development of wildlife contraceptives, contact the NWRC at (970) 266-6000 or visit our Web site at www.aphis.usda.gov/wildlife_damage/nwrc.

Wildlife Services Office Phone Numbers

For assistance on wildlife damage management issues in your State, please call Wildlife Services' toll-free number at 1-866-4USDAWS (1-866-487-3297) or one of the numbers listed below.

At headquarters (Riverdale, MD):

- Operational Support Staff (301) 734-7921

In the field:

- NWRC Headquarters (Fort Collins, CO) (970) 266-6000
- Eastern Regional Office (Raleigh, NC) (919) 855-7200
- Western Regional Office (Fort Collins, CO) (970) 494-7443

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Issued January 2010

www.aphis.usda.gov/wildlife_damage/nwrc

United States Department of Agriculture
Animal and Plant Health Inspection Service
Miscellaneous Publication No. 2035

Solutions Through Science

Wildlife Services
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National Wildlife Research Center